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(71) Applicant(s)
NEC Corporation
(Incorporated in Japan)
7-1 Shiba 5-chome, Minato-ku, Tokyo, Japan

(72) Inventor(s)
Yoichi Okano

(74) Agent and/or Address for Service
John Orchard & Co
Staple Inn Buildings North, High Holborn, LONDON,
WC1V 7PZ, United Kingdom

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(54) Abstract Title
Portable communication system and storage medium therefor

(57) A portable communication system and a storage medium storing 5 a program for the portable communication system which is capable of temporarily stopping transmissions from the portable communication system, while being capable of using other functions such as information processing function, etc. separately from the transmitting function. When the user inputs a transmission suspension command to the control circuit 1 using the data input section 6, the timer is activated 9. The timer generates a power cut-off signal to turn off a switch 12. As a result, the power supplied to the transmitting section 8 from the power circuit 11 via the power-supply circuit 13 is cut off, to cause the transmitting section 7 not to be operational. Thus, malfunctions in other electronic equipment and apparatus can be prevented. Since the other functional parts are supplied with power even while the transmission function is suspended, the user can play games, etc. using an information processing function. In an alternative a sensor is provided which, on receipt of a signal defining a prohibited area, initiates the transmission suspension program.

FIG. 1

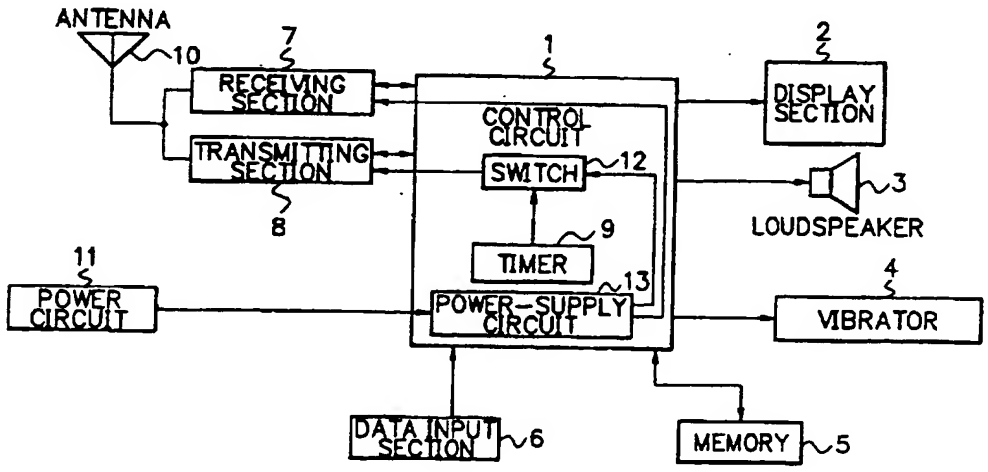

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FIG. 1

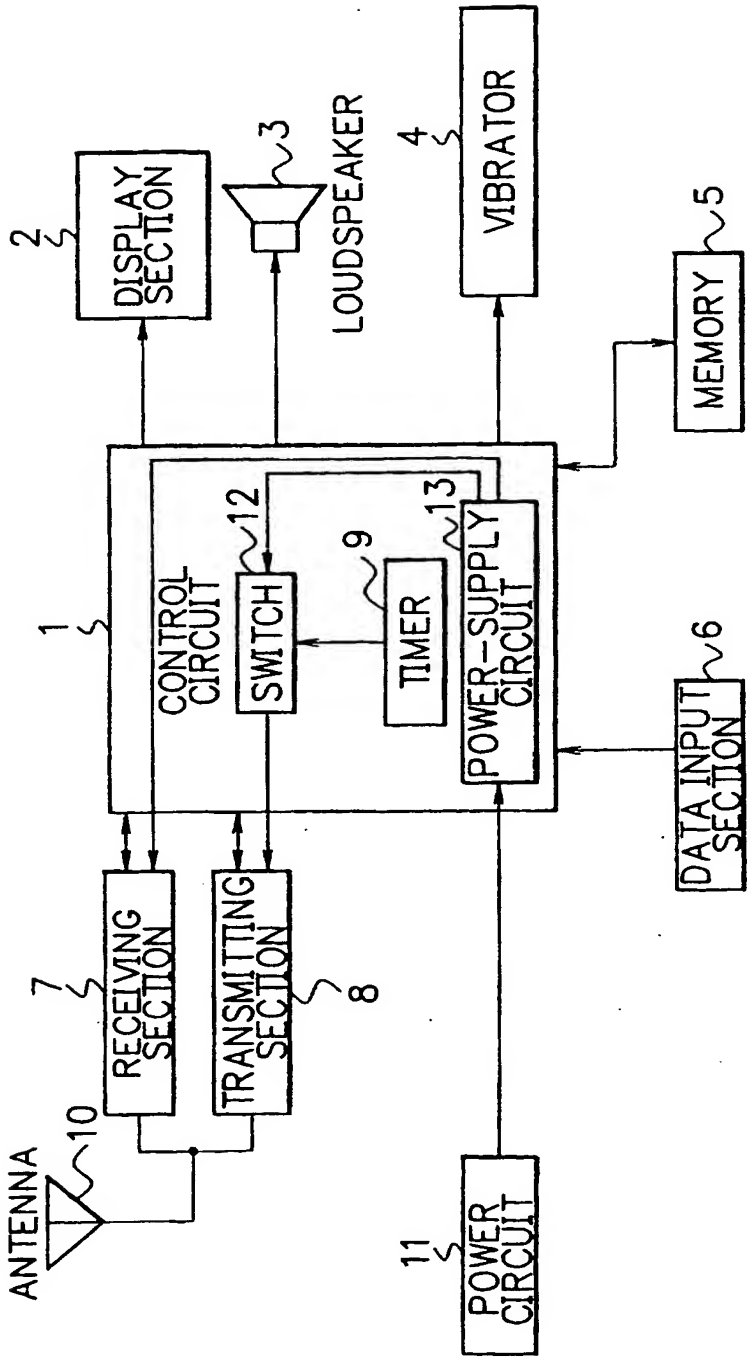


FIG. 2

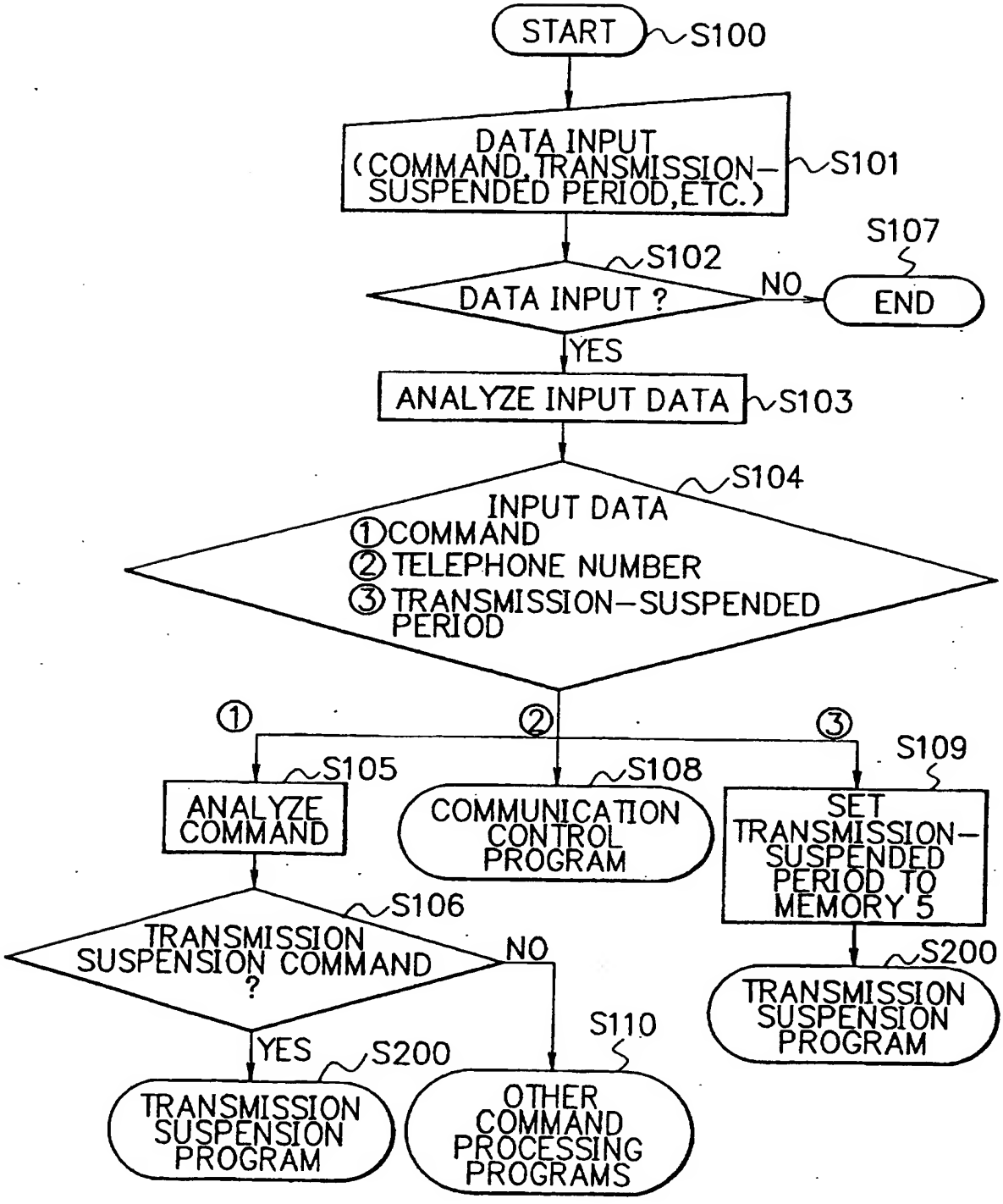


FIG. 3

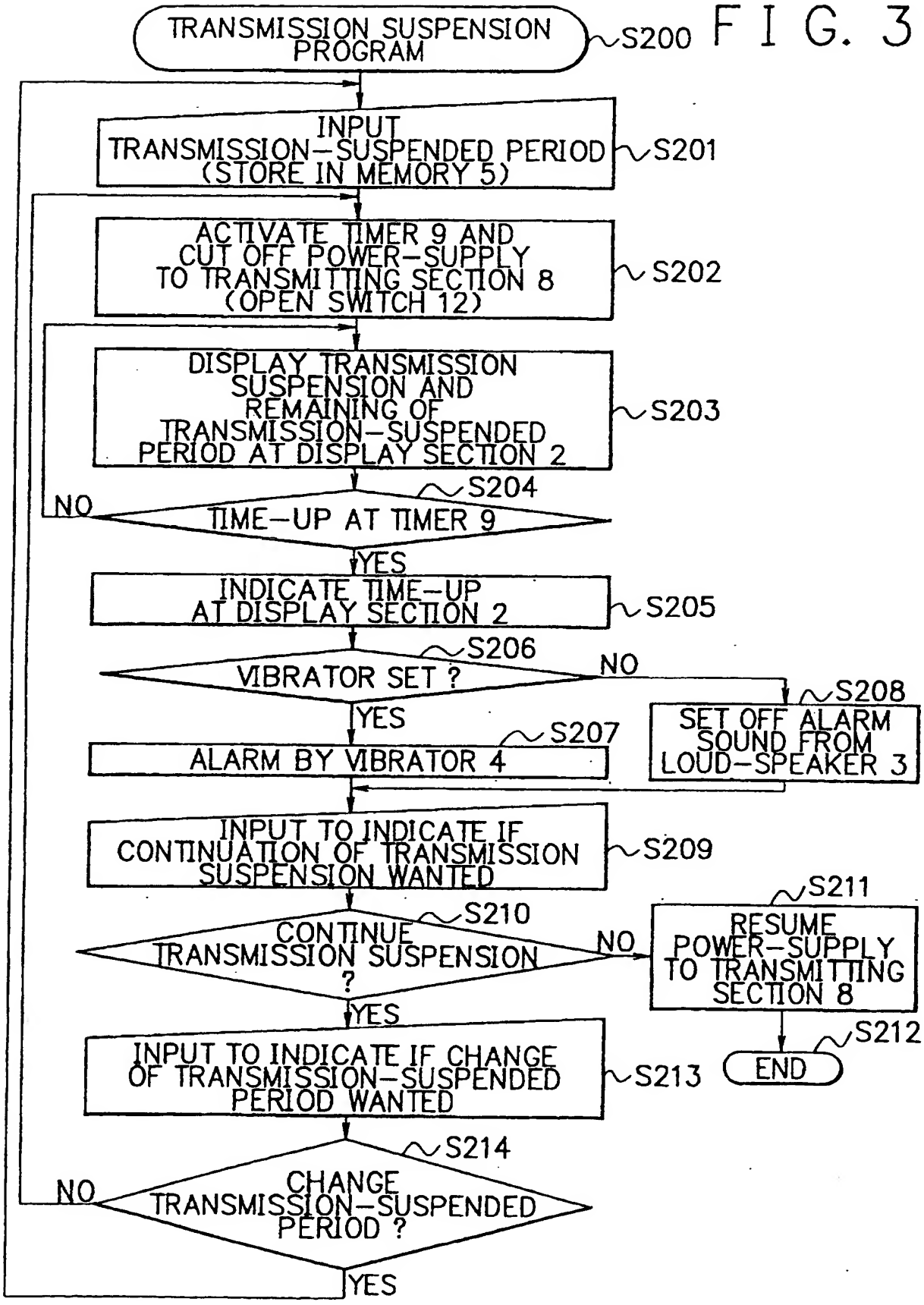


FIG. 4

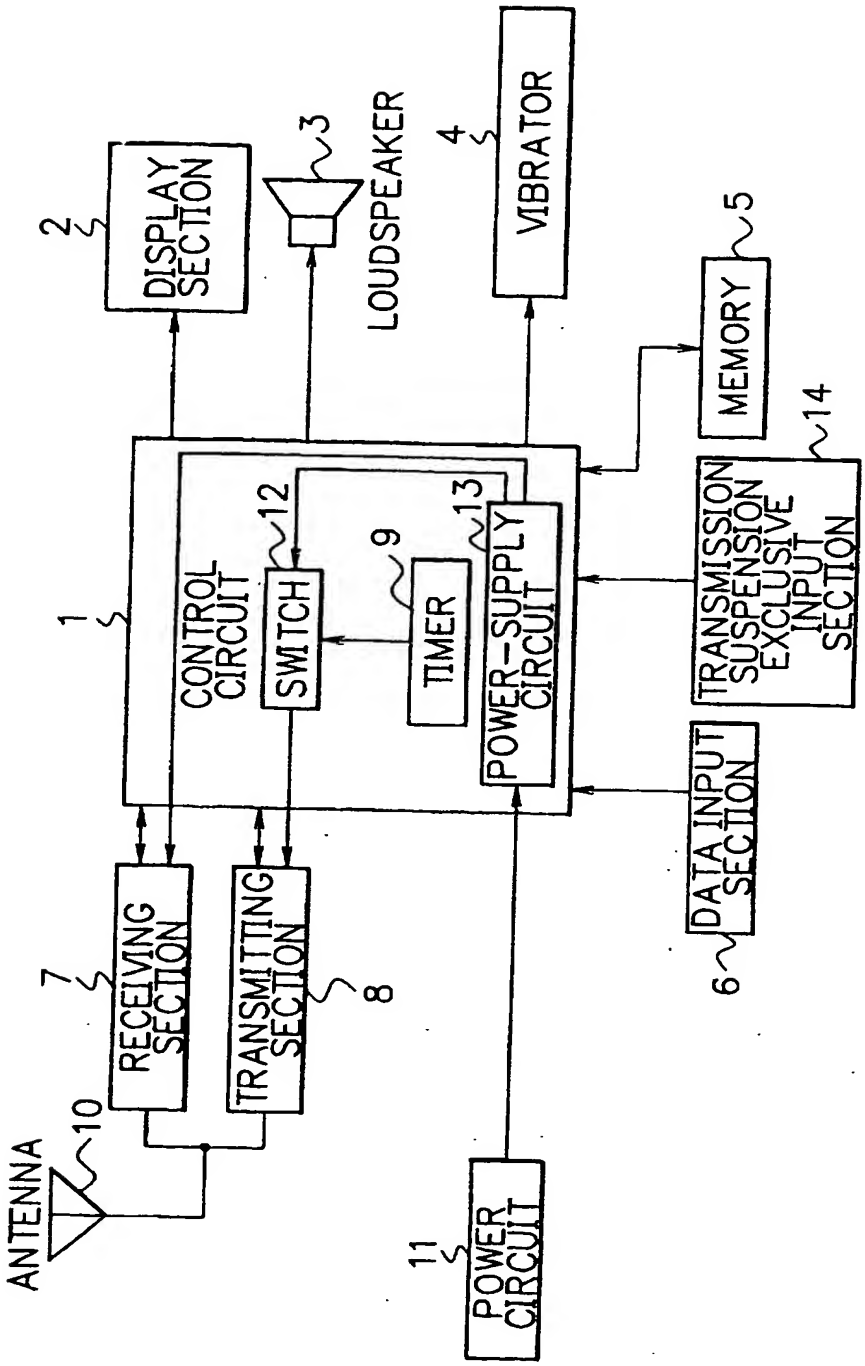


FIG. 5

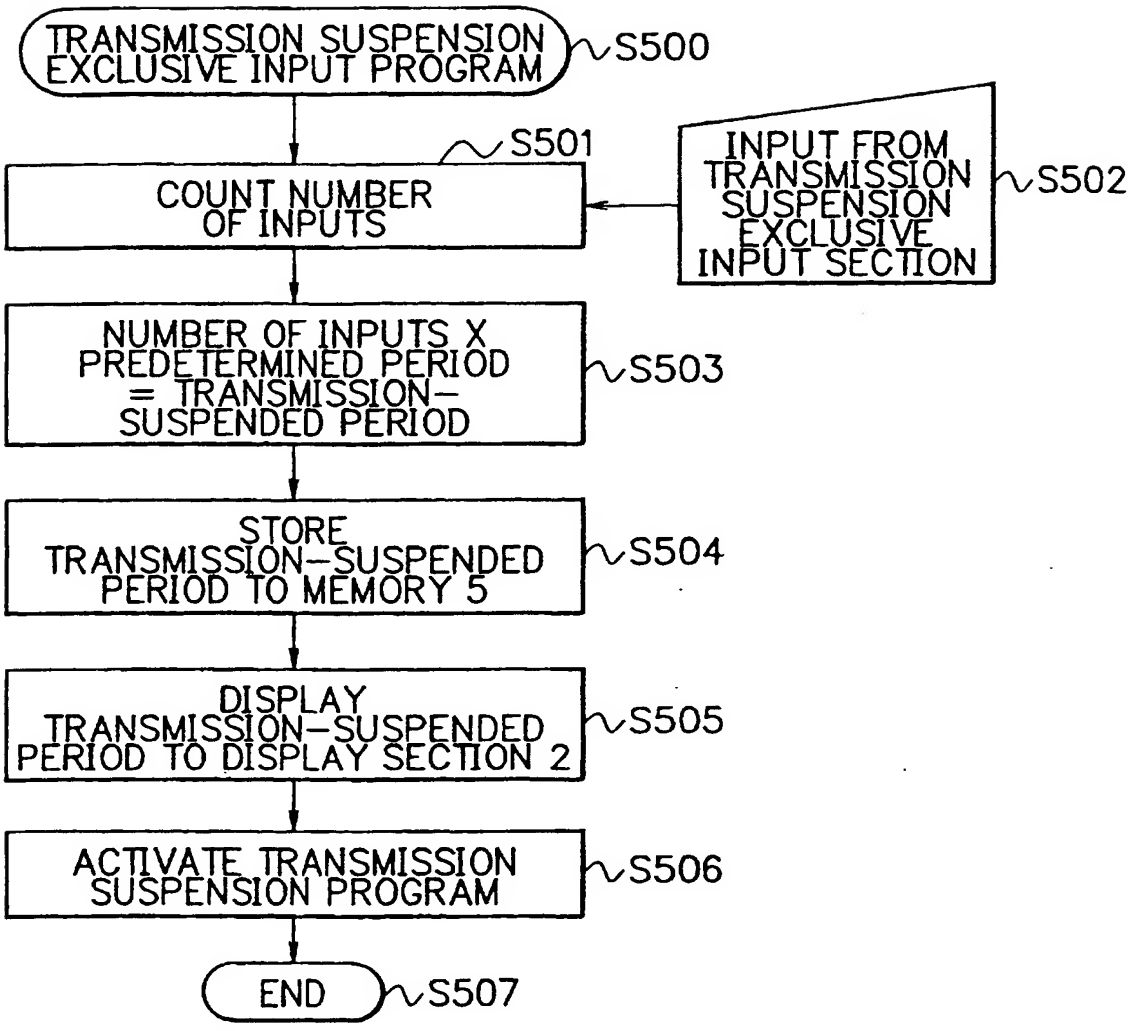


FIG. 6

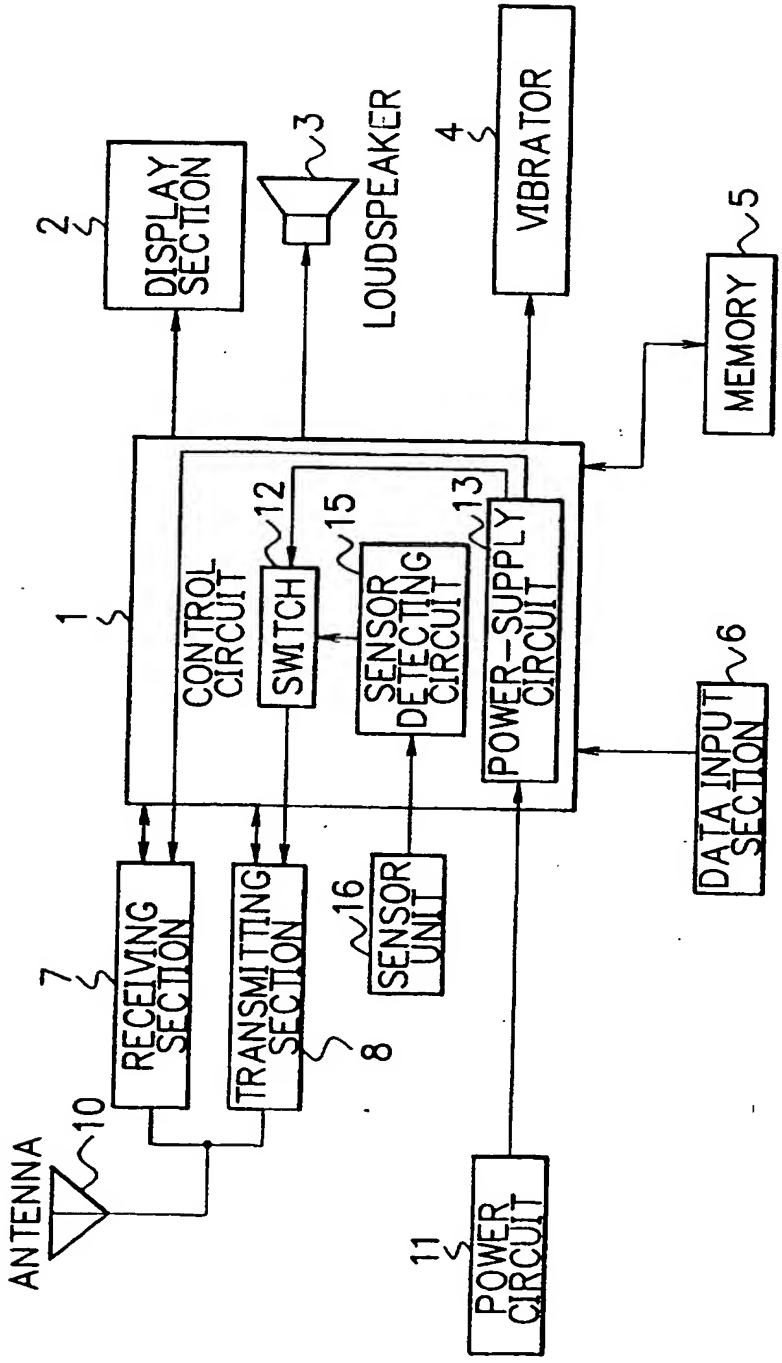


FIG. 7

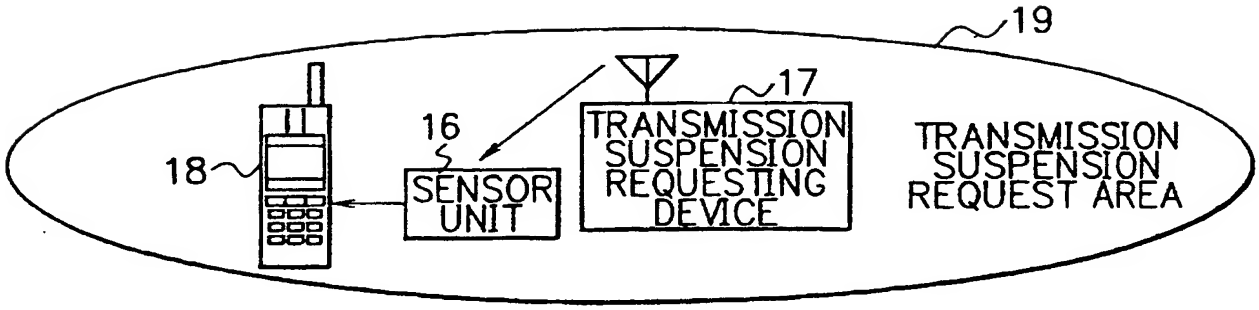


FIG. 8

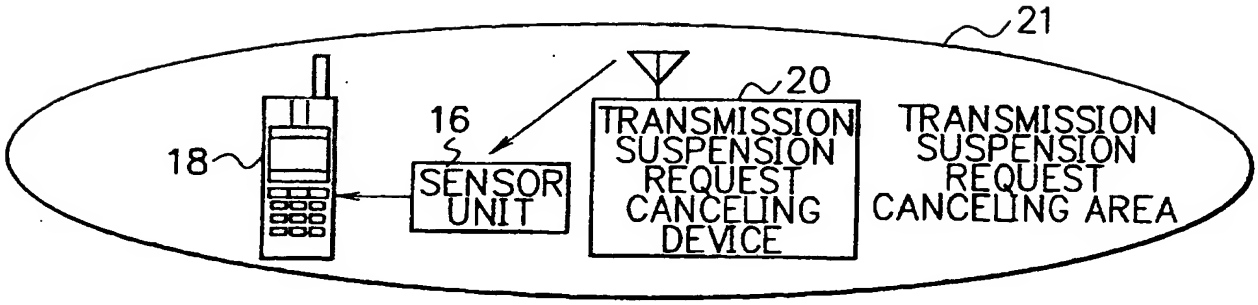
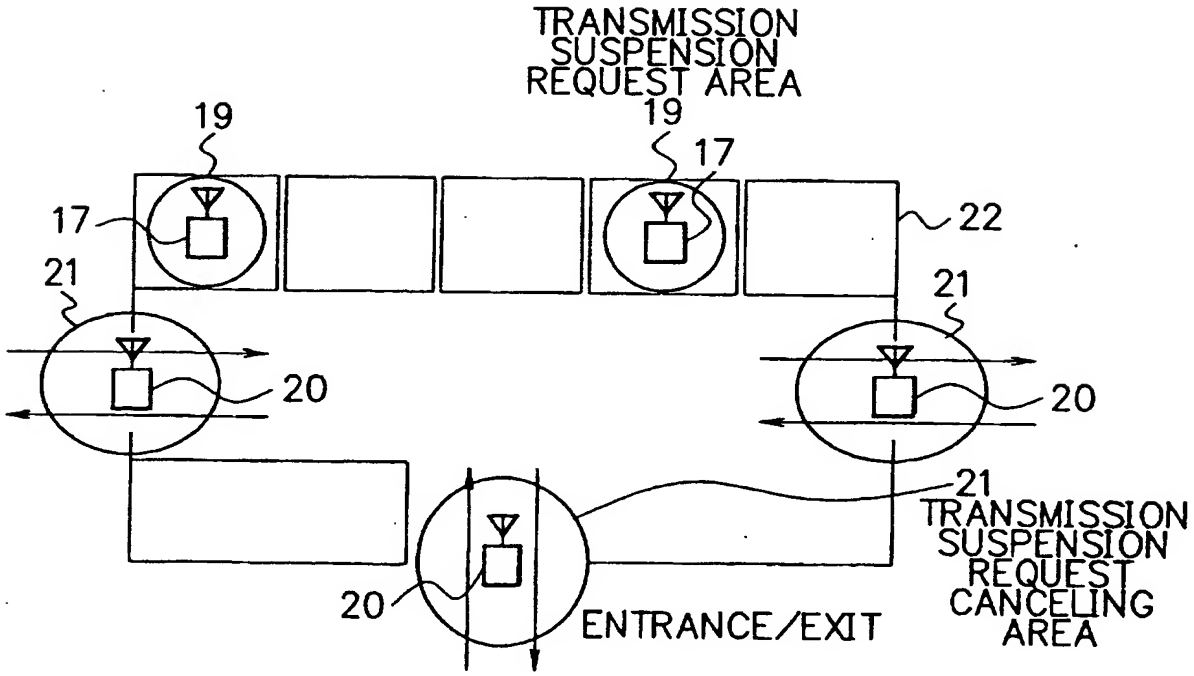


FIG. 9



PORTABLE COMMUNICATION SYSTEM AND STORAGE MEDIUM THEREFOR

The present invention relates to a portable communication system, such as a portable telephone system using radio communications, and to a storage medium storing a program for use in the portable communication system.

A portable communication system and a storage medium storing a program for use in the portable communication system, which are capable of controlling a transmission function separately from other functions will be described below, by way of example, in illustration of the present invention.

Generally, in previously proposed portable telephone systems, an information processing function enables the user to play games, or to refer to a telephone directory, etc., besides carrying on signal transmission and reception functions for communications. Such a previously proposed portable telephone system may have, for example, an incoming call denying unit, a sound recorder, or a vibrator, in order that any sound of an incoming call may be inhibited in places where the use of portable communication systems should be restrained.

In such previously proposed portable telephone systems, transmissions directed to a base station are occasionally carried out in the registration of a position and in the receipt of incoming calls, etc., even during a standby mode when the user is not communicating. Transmissions of this kind, directed to the base station may be conducted at all times, as long as the portable communication system has its power turned on.

In previously proposed portable telephone systems, the transmission, reception and information processing functions are all valid and effective while the power is on. However, the operation of a single function

cannot be individually controlled or terminated separately from the other functions.

As discussed above, in the previously proposed arrangements, a portable telephone may effect transmissions directed to the base station even when no telephone communication takes place. Such transmissions from the portable telephone can cause malfunctions in, for example, medical electronic equipment, such as artificial pacemakers, and electronic apparatus in aircraft. In this respect, it may be understood that this kind of negative influence can be prevented if the transmission function alone could be stopped. However, such an arrangement has not been possible in the previously proposed systems because a single function could not be separated from the other functions and controlled individually.

The problem discussed above can also be caused when the information processing function is in use, because a transmission to the base station is effected while the information processing function is used. Therefore, it has not been possible for the user to use the information processing function alone while carrying out transmissions from a portable telephone.

A feature of an arrangement to be described below, by way of example in illustration of the present invention is that there are a portable communication system and a storage medium storing a program applied to the portable communication system, which are capable of controlling the operation of a transmission function separately from other functions.

In a portable communication system with a transmitting section for transmitting signals and a function section having functions other than a transmitting function, to be described below, by way of example in illustration of the invention, there is a controlling means for suspending transmission from the transmitting section.

Other features of portable communication systems to be described below, by way of example in illustration of the present invention include the provision of a setting means for setting a certain transmission-suspended period when transmissions are to be suspended by the controlling means, a display means for indicating progress in the transmission-suspended period that is being set by the setting means, a first request means for requesting the user to determine whether the transmission suspension should be continued or not, after a lapse of the transmission-suspended period, a second request means responsive to the case in which the user determines that the transmission suspension should be continued after a lapse of the transmission-suspended period, which it requests the user to determine whether the transmission-suspended period previously being set by the setting means should be changed or not, a power-supply means for supplying power to the transmitting section and the function section, while the controlling means cuts off the power supplied to the transmitting section from the power-supply means, a receiving section in a function section for receiving signals, and/or an information processing section for performing information processing, except for signal transmission/reception, a storage medium with a program stored therein, provided in a portable communication system with a transmitting section for transmitting signals and a function section having functions other than a transmitting function, the program performing a process of suspending transmissions by the transmitting section, the program in the storage medium performing, in one arrangement, a process of setting a transmission-suspended period when transmissions are to be suspended, and in another arrangement, a process of displaying the progress of the transmission-suspended period.

In yet another arrangement, there is a process of requesting the user to determine whether the transmission suspension should be continued

even after a lapse of the transmission-suspended period, and in yet another arrangement there is a process of requesting the user to determine whether the transmission-suspended period previously set should be changed or not, in the case in which the user determines that the transmission suspension should be continued after a lapse of the transmission-suspended period.

In other arrangements to be described below by way of example, the program of the storage medium performs a process of supplying power to the transmitting section and the function section, and cuts off the power supplied to the transmitting section in the process of suspending transmissions, a process of receiving signals by the function section, and/or an information process, except for signal transmission reception, a process of sustaining transmissions based on an instruction from the outside, and a process of sustaining transmissions based on control signals received from the outside.

Features of methods to be described below, by way of example in illustration of the present invention, include the operation of portable communication systems, in which the controlling means controls transmissions on the basis of an operation, for example control signals, from the outside such that the transmissions are suspended.

Arrangements illustrative of the present invention will now be described, by way of example with reference to the accompanying drawings, in which:-

Fig. 1 is a block schematic circuit diagram of a portable telephone for use in describing one arrangement,

Fig. 2 is a flow chart for use in describing one method of operation of the arrangement shown in Fig. 1,

Fig. 3 is a flow chart for use in describing another method of operation of the arrangement shown in Fig. 1,

Fig. 4 is a block schematic circuit diagram of a portable telephone for use in describing another arrangement,

Fig. 5 is a flow chart for use in describing one method of operation of the arrangement shown in Fig. 4,

Fig. 6 is a block schematic circuit of a portable telephone for use in describing a further arrangement,

Fig. 7 is a schematic diagram for use in describing, by way of example, an application of a sensor unit,

Fig. 8 is a schematic diagram for use in describing, by way of example, the cancellation of a transmission suspension, and

Fig. 9 is a diagrammatic illustration for use in describing yet another method of operation.

Referring now to the drawings, Fig. 1 shows a circuit arrangement of a portable telephone system. To begin with, the structure and the distinctive operation will be described. In this arrangement, a portable communication system using radio communications is capable of controlling a transmission function, such that transmissions from a portable telephone can be suspended, and the use of the information processing function is made possible while the transmissions are suspended.

In Fig. 1, the portable communication system shown includes a control circuit 1, a display section 2, a loudspeaker 3, a vibrator 4, a memory 5, a data input section 6, a receiving section 7, a transmitting section 8, a timer 9, an antenna 10, a power circuit 11, a switch 12, and a power-supply circuit 13.

The control circuit 1 controls the overall processing as to the information processing function, the radio communication function and so forth. The display section 2 displays a transmission-suspended period, a current time, a communication period, character information, and image

information, etc. The vibrator 4 functions to indicate incoming calls and set off alarms. The memory 5 is for storing a transmission-suspended period, etc. The data input section 6 can be a keyboard, a pen-point input, or a touch panel, etc., which functions to input data concerning a transmission suspension command, etc. The receiving section 7 receives control signals and audio signals. The transmitting section 8 effects signal transmissions in accordance with a control by the control circuit 1. The timer 9 is to time the transmission-suspended period by a countdown. The power-supply circuit 13 is to distribute the power from the power circuit 11 to each part constituting the portable telephone system. The switch 12 is provided in between the power-supply circuit 13 and the transmitting section 8, and functions to supply or to cut off the power to the transmitting section 8.

In operation, the user inputs at least a transmission suspension command, or a transmission-suspended period through the data input section 6. In the case in which the transmission suspension command alone is input, the control circuit 1 is arranged to activate the timer 9 with the transmission-suspended period being set as an unlimited period of time. As a result, the switch 12 is turned off until the transmission suspension command is cancelled, at which time the power-supply from the power-supply circuit 13 is cut off.

In the case in which the user inputs the transmission-suspended period following the transmission-suspended command, or when the user inputs the transmission-suspended period alone, the timer 9 is also activated with a certain time-limit being set as the transmission-suspended period. While the timer is counting down the transmission-suspended period, the switch 12 is turned off and the power-supply to the transmitting section 8 is cut off. In this way, transmissions from the portable communication system can be stopped.

Accordingly, the user is able to suspend transmissions from the portable communication system, such transmissions sometimes being liable to cause malfunctions in electronic apparatus and equipment in, for example aircraft, and artificial pacemakers, etc. In this event, transmissions to the base station stop, and thus the portable communication system will not respond to, but will only receive control signals, etc. from the base station.

In the meantime, all parts but the transmitting section 8 are supplied with power, and therefore, the information processing function of the portable communication system, including for instance a telephone directory, a schedule manager, an editor, a browser, an image incorporation, and games, etc., can remain effective for use.

While the transmission function is suspended from the transmitting section 8, the display section 2 indicates the state of the transmissions being suspended, as well as the remaining time of the transmission-suspended period.

When the timer 9 finishes counting down the transmission-suspended period, the control circuit 1 uses the display section 2 to indicate visually that the time is up by means of characters, images, etc. At the same time, the control circuit 1 uses the loudspeaker 3 to indicate the situation by a sound, or the vibrator 4 to indicate the situation by vibrations. When the user does not request further suspension of transmissions after the user has been informed that the transmission-suspended period is over, the portable communication system returns to the normal transmitting operation.

Next, an example of the operation of an arrangement illustrative of the present invention will be described.

When a transmission suspension command is input from the data input section 6, the control circuit 1 requests the user to determine and input the transmission-suspended period. Such a data-input request to the

user is made through the display section 2. The memory 5 receives the input transmission suspension command, and the transmission-suspended period, etc. from the control circuit 1, so as to have the information stored therein.

The control circuit 1 activates the timer 9 when the transmission-suspended period is input as a result of which a certain limit is set to the transmission-suspended period. The control circuit 1 also activates the timer 9 when the transmission-suspended command alone is input, while setting the transmission-suspended period as an unlimited period of time. In this way, the timer 9 receives data about the transmission-suspended period from the memory 5, starts counting down the transmission-suspended period, and outputs a power cut-off signal so as to turn off the switch 12 and cut off the power to the transmitting section 8.

The control section 1 receives data about the remaining time of the transmission-suspended period from the timer 9, so as to display the data on the display section 2. In this event, the display section 2 also indicates that the transmission function is suspended.

When the timer 9 finishes counting down the transmission-suspended period, the control circuit 1 allows the situation to be displayed on the display section 2. At the same time, the situation is indicated by a sound or by vibrations through a loudspeaker 3 or a vibrator 4. In this event, the control circuit 1 uses the display section 2, to request the user to decide whether the transmission suspension should continue or not. When the user decides not to continue with the transmission suspension, the power cut-off signal is cancelled and the switch 12 is turned on so that the transmission section 8 will be supplied with power.

When the transmission suspension command alone is input, the timer 9 is activated with the transmission-suspended period being set as an unlimited period of time, which data is stored in the memory 5. In this case

therefore, there is no indication of the transmission-suspended period being over, nor any request to the user to decide whether the transmission suspension should be continued or not. The transmission suspension will be terminated when the transmission suspension command is cancelled.

Fig. 2 and Fig. 3 are flow charts showing the sequence of steps in the transmission suspension operation. In the following explanation, a command input by the user will be a transmission suspension command. Furthermore, a program that the control circuit 1 implements in response to the input of the transmission suspension command is considered as a transmission suspension program.

In Fig. 2, as the portable communication system is carrying out normal position registration, communication, etc. (step S100), the user inputs data, such as a transmission suspension command, a transmission-suspended period, etc (step S101). The portable communication system then determines that there is a data input (step S102), and analyses the input data to see what kind of data it is (step S103). When there is no data input at step S102, the operation is terminated (step S107).

An identifying process in respect of the result of the input data analysis (step S104) is carried out, and when the result indicates that the input data is a transmission suspension command, the input data is analysed as a command, and the operation proceeds to a process in a branch ①. On the other hand, when the input data is a transmission-suspended period, the operation will proceed to a process in a branch ③. At the process in branch ①, the kind of a command that the input command is will be analysed (step S105). At the process in the branch ③, the transmission-suspended period is stored in the memory 5 (step S109), in response to which the transmission suspension program is initiated (step S200). The process at branch ② is taken when a certain telephone number is input, in response to which a

communication control program for effecting a communication control is executed (step S108).

When the input command is determined as a transmission suspension command at step S105 as a result of the command analysis (step S106), a transmission suspension program will be activated (step S200). Furthermore, in the case in which the input command is a different command, a corresponding processing program for that particular command will be executed (step S110).

At step S200, as the transmission suspension program is activated, the user is requested to input data indicating for how long the transmission function should be suspended, i.e. the transmission-suspension period (step S201). However, when the process in branch ③ is taken, the step S201 will be omitted since the transmission-suspension period is already input. In the case in which no input of the transmission-suspension period in response to the request at step S201 is made, the transmission-suspension period will be set for an unlimited period of time. In the transmission suspension program in which the transmission-suspension period is input and set, the information will be stored in the memory 5. After the transmission-suspension period is set for the timer 9, the timer 9 is activated to start counting down the transmission-suspension period (step S202).

In this event, the timer 9 maintains the output of the power cut-off signal in the middle of the count-down, so as to turn off the switch 12 and cut off the power-supply to the transmitting section 8. Furthermore, in the transmission suspension program, in the case in which transmissions are suspended, the display section 2 displays the information indicating that the transmissions are suspended, as well as the remaining period for which the transmission is suspended (step S203).

The transmission suspension program then checks to see

whether the timer 9 has finished counting down the transmission-suspension period or not (step S204). As the timer 9 finishes counting down the transmission-suspension period, the situation is displayed on the display section 2 (step S205), so as to let the user know that the transmission suspension period which had been set by the user is finished. At the same time, in the case in which the vibrator 4 of the portable communication system has been selected, the vibrator 4 is vibrated (step S207), and in the case in which the loudspeaker 3 has been selected, the loudspeaker 3 sets off an alarm sound, so as to let the user know that the transmission-suspended period is over (step S208).

The transmission suspension program then requests the user to determine whether the transmission suspension should be continued or not (step S209). In the case in which it is determined that the suspension of the transmission should not be continued, (step S210), after the step of determining whether the transmission suspension should be continued or not (step S209), the timer 9 is stopped. Consequently, the power cut-off signal is cancelled, and the switch 12 is turned on, so that the transmission section 8 is supplied with power (step S211). At the same time, the transmission suspension program is terminated (step S212).

The above operation is different in the case in which the user inputs the transmission suspension command alone, because the timer 9 is set such that the transmission-suspension period is an unlimited period of time, and the transmission suspension will not be terminated unless the transmission suspension command is cancelled.

In the case in which the user inputs data indicating that the transmission suspension should be continued, the transmission suspension program requests the user to determine whether the transmission-suspension period should be changed or not (step S213). When the user inputs data

indicating that the transmission-suspension period is to be changed, the operation returns to step S201, where the transmission-suspension period is to be input again. On the other hand, when the user decides not to change the transmission-suspension period, the operation returns to step S202, after which the transmission suspension is continued.

Fig. 4 shows another arrangement illustrative of the present invention. As to the parts corresponding to those shown in Fig. 1, the same reference numbers will be used, and any repetition of the explanation thereof will be omitted. A difference between the arrangements of Fig. 1 and Fig. 4 is that a transmission suspension exclusive input section 14 is provided in the arrangement shown in Fig. 4. For the transmission suspension exclusive input section 14, a slide switch, or an input key, etc. can be used, for example.

Fig. 5 is a flow chart for use in showing the operation of the arrangement shown in Fig. 4 in which the portable communication system has the transmission suspension exclusive input section 14. Let us assume that the transmission-suspension period has previously been set to the transmission-suspension exclusive input section 14. For instance, in the case in which the transmission suspension exclusive input section 14 is an input key, the transmission-suspension period can be set by pressing the input key several times. As the user inputs the transmission-suspension period through the transmission suspension exclusive input section 14, the transmission suspension exclusive input program is activated (step S500). When the user further attempts to input the transmission-suspension period by the transmission suspension exclusive input section 14 (step S502), the transmission suspension exclusive input program counts the number of times that the transmission-suspension period is being input (step S501). Then the predetermined period of time is multiplied by the counted number of inputs, to

obtain the transmission-suspension period (step S503) which is to be stored in the memory 5 (step S504).

Then after the transmission suspension exclusive input program displays the transmission-suspension period to the display section 2 (step S505), the transmission suspension program is activated (step S506), after which the whole operation is terminated (step S507). The transmission suspension program operates using the transmission-suspension period stored in the memory 5 by the transmission suspension exclusive input program. In this way, the transmission suspension can be set without having to input the transmission suspension command and the transmission-suspension period from the data input section 6.

Referring now to Fig. 6 there is shown a sensor detecting circuit 15 and a sensor unit 16 in place of the timer 9 shown in Fig. 4. The rest of the arrangement is the same as in Fig. 1. The sensor detecting circuit 15 is to be used with the sensor unit 16 connected thereto, and it serves to control the transmission suspension on the basis of a detection result by the sensor unit 16. One example of the sensor unit 16 would be a receiver having a specific low-power.

Referring to Fig. 7 there is shown one example of the application of the sensor unit 16. A transmission suspension requesting device 17 transmits a transmission suspension request signal to the sensor unit 16. The sensor unit 16 receives this transmission suspension request signal. A portable telephone 18 which is shown has the circuit arrangement shown in Fig. 6. Furthermore, there is shown a transmission suspension request area 19, which is an area in which the transmission suspension request signal from the transmission suspension requesting device 17 has an effect.

When the portable telephone 18 enters the transmission

suspension request area 19, and the sensor unit 16 receives a transmission suspension request signal, the sensor unit 16 passes the signal on to the sensor detecting circuit 15. Then the sensor detecting circuit 15 transmits a power cut-off signal to the switch 12, and at the same time it informs the control circuit 1 that the transmission function is rendered invalid. The control circuit 1 then allows the display section 2 to indicate that transmissions have been suspended. As a consequence, the switch 12 is turned off, and transmissions from the transmitting section 8 are suspended.

Referring to Fig. 8, it will be shown how the suspension of transmissions is cancelled.

A transmission suspension request cancelling device 20 shown is a device for transmitting a transmission suspension request cancelling signal to the sensor unit 16. The transmission suspension request cancelling signal functions to allow the sensor detecting circuit 15 to cancel the power cut-off signal directed to the switch 12. A transmission suspension request cancelling area 21 shown is an area in which the transmission suspension request cancelling signal is effective.

After the sensor unit 16 receives the transmission suspension request signal, the sensor detecting circuit 15 continues to output the power cut-off signal to the switch 12 until the sensor unit 16 receives the transmission suspension request cancelling signal. That is, when the sensor unit 16 receives the transmission suspension request signal, transmissions from the portable telephone 18 will be suspended until the sensor unit 16 receives the transmission suspension request cancelling signal.

Referring now to Fig. 9, the transmission suspension requesting device 17 is shown placed in an area in which the portable telephone 18 should stop transmissions therefrom, i.e. in the transmission suspension request area 19. On the other hand, the transmission suspension request

cancelling device 20 is set at an exit/entrance 22, which is an area including both an area where the portable telephone is allowed to transmit and an area where the portable telephone should suspend any transmission therefrom, so as to form the transmission suspension request cancelling area 21. In this manner, the user does not have to go through any special operation, but the suspension of transmissions from the portable telephone 18 can be controlled automatically.

In other words, by means of the sensor detecting circuit 15, the sensor unit 16, the transmission suspension requesting device 17, and the transmission suspension request cancelling device 20, transmissions from the portable telephone 18 can be controlled automatically from the outside, even in the case in which the user forgets to stop the transmissions. Moreover, by changing the form of the sensor unit 16, the transmission suspension request signal may be constituted by media of various forms, for example radio waves.

In realizing the arrangements shown in Fig. 1, Fig. 4 and Fig. 6, by employing a computer system using a CPU, a memory of the computer system could be the storage medium described above. As to this storage medium, it may be a semiconductor memory, an optical disc, a magneto-optical disc, or a magnetic recording medium, for example.

As has been discussed above, with respect to the portable communication system and the storage medium storing a program for the portable communication system, the transmission function of the portable communication system can be temporarily terminated. In addition to that, while transmissions are suspended, other functions including for instance a receiving function, an information processing function, etc. can be used in a separate manner. Therefore, at places such as hospitals, aircraft and so forth, where portable communication systems should preferably not be used,

functions other than the transmission function can be effectively used while transmissions from the portable communication system are suspended.

As to the portable communication system and the storage medium storing the program of the portable communication system of the arrangements described, a period for suspending transmissions can be set on the basis of the user's request.

Furthermore, in the portable communication system and the storage medium storing the program of the portable communication system described above, the suspension of the transmission can be effected in response to the will of the user or it can be automatically effected from the outside.

It will be understood that, although particular arrangements have been described, by way of example, variations and modifications thereof, as well as other arrangements, may be conceived within the scope of the appended claims.

CLAIMS

1. A portable communication system including a transmitting section for transmitting signals and a function section having functions other than a transmitting function, and a controlling means for suspending transmissions from the transmitting section.

2. A portable communication system as claimed in claim 1, including a setting means for setting a certain transmission-suspension period during which transmissions are to be suspended by the controlling means.

3. A portable communication system as claimed in claim 2, including a display means for indicating the progress of the transmission-suspension period that has been set by the setting means.

4. A portable communication system as claimed in claim 2, including a first request means for requesting a user to determine whether the transmission suspension should be continued or not after the lapse of the transmission-suspension period.

5. A portable communication system as claimed in claim 2, including a second request means responsive to the case in which the user determines that the transmission suspension should be continued after the lapse of the transmission-suspension period, for requesting the user to determine whether the transmission-suspension period previously set by the setting means should be changed or not.

6. A portable communication system as claimed in claim 1, including a power-supply means for supplying power to the transmitting section and the function section, wherein the controlling means is arranged to cut off the power supplied to the transmitting section from the power-supply means.

7. A portable communication system as claimed in claim 1, wherein the function section includes a receiving section for receiving signals, and/or an information processing section for processing information, except for transmitted or received signals.

8. A portable communication system as claimed in claim 1, wherein the controlling means controls the transmission, on the basis of an operation controlled from the outside, such that the transmissions are suspended.

9. A portable communication system as claimed in claim 1, wherein the controlling means controls the transmissions, on the basis of control signals received from the outside, such that the transmissions are suspended.

10. A storage medium with a program stored therein, provided in a portable communication system with a transmitting section for transmitting signals and a function section having functions other than a transmitting function, the program carrying out the step of suspending transmissions by the transmitting section.

11. A storage medium with a program stored therein as claimed

in claim 10, wherein the program carries out the step of setting a transmission-suspension period when transmissions are to be suspended.

12. A storage medium with a program stored therein as claimed in claim 11, wherein the program carries out the step of displaying the progress of the transmission-suspension period.

13. A storage medium with a program stored therein as claimed in claim 11, wherein the program carries out the step of requesting the user to determine whether the transmission suspension should be continued even after a lapse of the transmission-suspension period.

14. A storage medium with a program stored therein as claimed in claim 11, wherein the program carries out the step of requesting the user to determine whether the transmission-suspension period previously set should be changed or not, in the case in which the user determines that the transmission suspension should be continued after a lapse of the transmission-suspension period.

15. A storage medium with a program stored therein as claimed in claim 10, wherein the program carries out the step of supplying power to the transmitting section and the function section, and cuts off the power supplied to the transmitting section by the process of suspending transmissions.

16. A storage medium with a program stored therein as claimed in claim 10, wherein the program carries out the step of receiving signals by the function section, and/or an information processing, except for transmitted

or received signals.

17. A storage medium with a program stored therein as claimed in claim 10, wherein the step of sustaining transmissions is based on an instruction received from the outside.

18. A storage medium with a program stored therein as claimed in claim 10, wherein the step of sustaining transmissions is based on control signals received from the outside.

19. A portable communication system as claimed in claim 1 substantially as described herein with reference to any one of Figs. 1 to 9 of the accompanying drawings.

20. A storage medium with a program stored therein as claimed in claim 10 substantially as described herein with reference to any one of Figs. 1 to 9 of the accompanying drawings.

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Other: On-line: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2320164 A	(NEC) note Figs 8-10	1, 6, 8, 10, 15, 17, 18
X	GB2317304 A	(NEC) whole doc	1, 6, 8, 10, 15, 17, 18
X	GB2266211 A	(Motorola) whole doc	1, 6, 8, 10, 15, 17
X	EP891110 A	(Alsthom CGE) whole doc	1-2, 6, 8-9
X	US5819170	(Nippon Electric) whole doc	1, 6, 8, 10, 15, 17

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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